

The Issuance of State and Local Debt during the United States' Great Recession*

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October 19, 2011

*Prepared for presentation at the Washington Commission on State Debt Meeting, October 21, 2011, SEATAC.

A Regression Model of Determinants of State and Local Debt Issuance

Bond issuance data from 2008, 2009, and 2010 obtained through personal correspondence with an analyst at Thomas Reuters (TR).

- State Debt Issues consists of the TR categories of higher education, state authority, and state.
- Local Debt Issues consists of local the TR categories of local authority, municipal, and county.
- State/Local Debt Issues includes them all. In these aggregations, Build America Bond (BAB) issues are lumped together with the more traditional bond issues made by state and local governments.
- The result is the four state-based dependent variables used in our regression analyses: (1) Real State Debt Issues PC (per capita), (2) Real Local Debt Issues PC, (3) Real State/Local Debt Issues PC, and (4) Real BAB Debt Issues PC.
- Regressions using the first three as dependent variables utilize a pooled data set that contains each of the 50 states observed over three years for 150 observations.
- Since the issuance of BABS only occurred during the latter half of 2009 and for all of 2010, we chose to lump the 2009 half-year issuance together with the 2010 full-year issuance.
- We begin with the simple relationship that desired debt in period “t” (D_t), is equivalent to debt already accumulated in the previous period “t-1” (D_{t-1}), plus new bond issues in period “t” (B_t), less bond retirement in period “t” (R_t):

$$D_{t,i} = D_{t-1,i} + B_{t,i} - R_{t,i} \quad (1);$$

where,

$i = 1, 2, 3, \dots 50$ states,

$t =$ time periods under consideration.

- The data we have collected represent different forms of B_t in equation (1) above. Solving for B_t in this equation yields:

$$B_{t,i} = D_{t,i} - D_{t-1,i} + R_{t,i} \quad (2).$$

$$D_{t,i} + R_{t,i} = f(\text{Demographics}_{t,i}, \text{Politics}_{t,i}, \text{Economics}_{t,i}, \text{Institutions}_{t,i}, \text{Borrowing Costs}_{t,i}), \quad (3);$$

where,

Demographics_{t,i} = f (Perc Pop Public K-12 Enroll_{t,i}, Perc Pop Change 2000-10_i),

Politics_{t,i} = f (BRH Liberal Citizen Ideology 2008_i),

Economics_{t,i} = f (Real Gross State Product PC_{t,i}, Real Federal Intergov Rev PC_{t,i},
State Fiscal Balance as Perc of Expend_{t,i}, Unemployment Rate_{t,i}, Per Poor
Roads_{t,i}),

Institutions_{t,i} = f (No Debt Limits_i, No Mandatory Rev or Spend Limits_i, No State
Income Tax_i, Perc State/Loc Expend Local_{t,i},

Borrowing Costs_{t,i} = f (Real Total 2007 Debt 1000\$s PC_i, Year 2009 Dummy_i, Year
2010 Dummy_i).

- Also, include a Washington State Dummy variable that takes on a one when the observation in the data set is from this state and a zero otherwise.

Table 1: Variable Name, Description, and Source

Variable Name	Variable Description	Variable Source
Real State Debt Issues PC*	Higher education, state authority, and state bond issue categories added together by state in 2009 per-capita, real dollars for separate years 2008, 2009, and 2010	Personal correspondence with an analyst at Thomas Reuters
Real Local Debt Issues PC	Local authority, municipal, and county state bond issue categories added together by state in 2009 per capita real dollars for separate years 2008, 2009, and 2010	Personal correspondence with an analyst at Thomas Reuters
Real State/Local Debt Issues PC	Real State Debt Issues PC plus Real Local Debt Issues PC	Personal correspondence with an analyst at Thomas Reuters
Real BAB Debt Issues PC	Build America Bond Issues by state in 2009 per-capita, real dollars for partial year 2009 and full year 2010 added together	<i>The Bond Buyer</i> , www.bondbuyer.com
Perc Pop Public K-12 Enroll	Percentage of state's population enrolled in K-12 public school for academic years 2007/08, 2008/09, and 2009/10	<i>Digest of Education Statistics</i> , www.nces.ed.gov/programs/digest
Perc Pop Change 2000-10	Percentage change in state's population from 2000 to 2010	Calculated from 2010 Census data at http://2010.census.gov/2010census and 2000 Census data at http://www.census.gov/main/www/cen2000.html
BRH Liberal Citizen Ideology 2008	Drawn from the "revised 1960-2008 citizen ideology series" measure developed by Berry, Ringquist, and Hanson (1998) for 2008 where 0 = most conservative and 1 = most liberal	Personal correspondence with Richard Fording, political scientist at the University of Kentucky.
Real Gross State Product PC	Gross state product in 2009 per-capita, real dollars divided by population for each year for separate years 2008, 2009, and 2010	Gross state product from Bureau of Economic Analysis; Regional Economic Accounts, http://www.bea.gov/regional/gsp
Real Federal Intergov Rev PC	Federal Intergovernmental revenue shared with a state's state/local governments in 2009 per-capita, real dollars for specific years 2007, 2008, and 2009.	United States Census Bureau, <i>State Government Finances</i> , www.census.gov/govs/state
State Fiscal Balance as Perc of Expend	End of fiscal year state government budget balance as a percentage of that year's expenditure by state by state for separate fiscal years 2008, 2009, and 2010	National Governors Association, <i>The Fiscal Survey of the States</i> , http://nasbo.org/Publications/FiscalSurvey
Unemployment Rate	Average unemployment rate by state for separate years 2008, 2009, and 2010	Bureau of Labor Statistics, <i>Regional and State Unemployment Annual Averages</i> , http://www.bls.gov/schedule/archives/laus_nr.htm
Perc Poor Roads	Percentage of state's roads deemed in "poor or mediocre" condition in 2009	American Society of Civil Engineers, <i>Report Card for America's Future</i> , http://www.infrastructurereportcard.org/states
No Debt Limits	Dummy variable equal to one if a state in 2008 had no policy to limit debt service and/or no policy to limit authorized debt	National Association of State Budget Officers, <i>Budget Processes in the States</i> , Table 12, http://nasbo.org/LinkClick.aspx?fileticket=AaAKTnigucg=&tabid=80
No Mandatory Rev or Spend Limits	Dummy variable equal to one if a state in 2008 had no policy to limit it taxes and/or no policy to limit expenditures	National Association of State Budget Officers, <i>Budget Processes in the States</i> , Table 13, http://nasbo.org/LinkClick.aspx?fileticket=AaAKTnigucg=&tabid=80
No State Income Tax	Dummy variable equal one if a state in 2008 had no statewide income tax	The Tax Foundation, <i>State Individual Income Tax Rates</i> , http://www.taxfoundation.org/taxdata/show/228.html
Perc State/Loc Expend Local	Percentage of a state's total state and local expenditure that is spent at the local level for specific years 2007, 2008, and 2009.	United States Census Bureau, <i>State Government Finances</i> , www.census.gov/govs/state
Real Total 2007 Debt 1000\$s PC _i	Total state and local debt in 2009 per-capita, real thousands of dollars for 2007	United States Census Bureau, <i>State and Local Government Finances</i> , http://www.census.gov/govs/estimate/historical_data_2007.html#state_local

*PC (Per Capita) with Population from U.S. Census *American Fact Finder*, <http://factfinder.census.gov>.

Real dollars measured in 2009 constant dollars based upon the Bureau of Labor Statistics Consumer Price Index for all U.S. urban consumers at www.bls.gov/data

Table 2: Variable Descriptive Statistics for 150 Observation Regressions

<u>Variable Name</u>	<u>WA Mean</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>Minimum</u>	<u>Maximum</u>
Real State Debt Issues PC	664.23	607.94	409.74	0	2,202.93
Real Local Debt Issues PC	400.30	402.25	271.16	0	1,642.51
Real State/Local Debt Issues PC	1,064.53	1,003.09	500.89	53.19	3,841.18
Perc Pop Public K-12 Enroll	15.72	15.99	1.44	13.39	21.63
Perc Pop Change 2000-10	14.09	9.86	7.21	-0.55	35.15
BRH Liberal Citizen Ideology 2008	70.06	61.34	17.44	25.23	91.85
Real Gross State Product PC	50,384.26	45,747.46	8,980.53	31,980.40	72,757.67
Real Federal Intergov Rev PC	1,399.69	1,767.32	685.58	933.15	5,188.17
State Fiscal Balance as Perc of Expend	3.6	10.03	19.88	-7.50	159.20
Unemployment Rate	8.13	7.49	2.38	3.1	14.00
Perc Poor Roads	33.0	32.6	13.82	11.0	78.0
No Debt Limits	0	0.40	0.49	0	1
No Mandatory Rev or Spend Limits	0	0.42	0.50	0	1
No State Income Tax	1	0.20	0.40	0	1
Perc State/Loc Expend Local	54.51	50.20	9.37	21.11	66.45
Real Total 2007 Debt 1000\$s PC _i	86.68	61.33	17.44	25.23	91.85

Table 3: Variable Descriptive Statistics for 50 Observation Regression

<u>Variable Name</u>	<u>WA Value</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>Minimum</u>	<u>Maximum</u>
Real BAB Debt Issues PC	920.23	441.28	305.09	11.39	1,055.69
Real Traditional Debt Issues PC	2,790.66	2,507.43	888.43	914.14	5,069.53
Perc Pop Public K-12 Enroll	15.62	15.91	1.44	13.59	21.05
Perc Pop Change 2000-10	14.09	9.86	7.21	-0.55	35.15
BRH Liberal Citizen Ideology 2008	70.07	61.34	17.44	25.23	91.85
Real Gross State Product PC	50,196.97	45,679.28	8,916.50	32,412.89	68,946.62
Real Federal Intergov Rev PC	1,455.36	1,824.41	684.72	1,061.11	4,479.53
State Fiscal Balance as Perc of Expend	1.65	8.95	21.36	-6.20	143.15
Unemployment Rate	9.45	8.59	2.0	4.1	13.25
Perc Poor Roads	33	32.6	13.82	11.0	78.0
No Debt Limits	0	0.40	0.49	0	1
No Mandatory Rev or Spend Limits	0	0.42	0.50	0	1
No State Income Tax	1	0.20	0.40	0	1
Perc State/Loc Expend Local	54.51	50.20	9.37	21.11	66.45
Real Total 2007 Debt 1000\$s PC _i	86.68	61.33	17.44	25.23	91.85

Table 4: 150 Observation Regression Results

<u>Explanatory Variable</u>	<u>Dependent Variable</u>	<u>Real State Debt Issues PC</u> (Mean=\$607.94) [WA Mean = \$664.23]	<u>Real Local Debt Issues PC</u> (Mean=\$402.25) [WA Mean = \$400.29]	<u>Real State/Local Debt Issues PC</u> (Mean=\$1,003.09) [WA Mean = \$1,064.53]
Constant		-834.19 (628.11)	98.16 (378.20)	-1,077.22* (551.92)
Washington State Dummy		-135.55 (116.22)	-223.39*** (82.04)	-338.40*** (103.96)
Dummy 2009		104.16 (102.11)	147.40** (74.57)	253.32* (140.167)
Dummy 2010		45.91 (85.48)	166.45*** (54.95)	189.73** (92.95)
Perc Pop Public K-12 Enroll		70.88** (31.39)	-23.22 (20.05)	57.09** (26.22)
Perc Pop Change 2000-10		-2.50 (6.36)	10.56** (3.77)	7.44 (7.27)
BRH Liberal Citizen Ideology 2008		6.01** (2.40)	-0.99 (1.54)	6.22** (2.60)
Real Gross State Product PC		0.0144*** (0.0049)	-0.0031 (0.0027)	0.0129*** (0.0049)
Real Federal Intergov Rev PC		0.0819 (0.0719)	0.0149 (0.0457)	0.1057 (0.0854)
State Fiscal Balance as Perc of Expend		-7.736*** (2.15)	1.46 (1.15)	-6.25*** (1.81)
Unemployment Rate		-18.05 (21.22)	-25.69* (13.66)	-43.86* (24.30)
Perc Poor Roads		0.6250 (2.439)	-0.0963 (1.5281)	0.7723 (2.2309)
No Debt Limits		-45.66 (64.91)	-55.81* (33.81)	-90.19 (69.09)
No Mandatory Rev or Spend Limits		-108.00 (75.89)	-25.33 (50.68)	-130.75 (87.90)
No State Income Tax		-14.76 (112.52)	-79.14 (72.09)	-82.50 (111.75)
Perc State/Loc Expend Local		-16.15*** (4.37)	10.92*** (2.86)	-3.62 (4.01)
Real Total 2007 Debt 1000\$ PC _i		3.36 (2.06)	6.15*** (1.53)	8.45*** (2.89)
R-Squared		0.669	0.696	0.639

***Indicates statistical significance of regression coefficient at greater than 99 percent confidence in a two-tailed test. ** indicates greater than 95 to 99 percent confidence. * indicates greater than 90 to 95 percent confidence.

Table 5: 50 Observation Regression Results

<u>Explanatory Variable</u>	<u>Real BAB Debt Issues PC</u> (Using Endogenous Real Traditional Debt Issues PC^) (Mean=\$441.28) [WA = \$920.23]
Constant	-1,949.52** (793.34)
Washington State Dummy	-184.04 (162.87)
Real Traditional Debt Issues PC	-0.2845** (0.1336)
Perc Pop Public K-12 Enroll	98.89** (41.72)
Perc Pop Change 2000-10	0.6291 (6.5899)
BRH Liberal Citizen Ideology 2008	2.68 (3.69)
Real Gross State Product PC	0.0199*** (0.0058)
Real Federal Intergov Rev PC	-0.0331 (0.0723)
State Fiscal Balance as Perc of Expend	-6.94*** (2.38)
Unemployment Rate	-6.14 (20.16)
Perc Poor Roads	5.85*** (2.18)
No Debt Limits	-137.43* (81.04)
No Mandatory Rev or Spend Limits	155.58** (64.09)
No State Income Tax	162.95** (71.80)
Perc State/Loc Expend Local	-8.57* (4.73)
Real Total 2007 Debt 1000\$s PC _i	15.37*** (3.84)
<u>R-Squared</u>	0.619

***Indicates statistical significance of regression coefficient at greater than 99 percent confidence in a two-tailed test. ** indicates greater than 95 to 99 percent confidence. * indicates greater than 90 to 95 percent confidence.

^Instruments used and source: Percentage Households with Income 75 to 99K, Percentage Households with Income 100 to 124K, Percentage Households with Income 125 to 149K, Percentage Households with Income 150 to 199K, Percentage Households with Income 200K+ [all previous from *United States Statistical Abstract*, 2009, Money Income of Households, http://www.census.gov/compendia/statab/2009/cats/income_expenditures_poverty_wealth/household_income.html ; Households in Thousand with Wealth greater than 1000K [State Millionaires, 2006, http://www.netstate.com/states/tables/state_millionaires_household.htm], Highest Marginal Income Tax Rate, Taxable Income Value that Highest Marginal Income Tax Paid [all previous from The Tax Foundation, 2009, *State Individual Income Tax Rates*, <http://www.taxfoundation.org/taxdata/show/228.html>].

Table 6: Statistically Significant Elasticities from Tables 5 and 6

<i>Cell Values Represent Respective Statistically Significant Elasticities (Except for dummy variables where represents (respective regression coefficient / mean of respective dependent variable) x 100</i>	<u>Real State/Local Debt Issues PC</u>	<u>Real BAB Debt Issues PC</u>
Washington State Dummy	-0.31	-0.42
Real Traditional Debt Issues PC	not used	-1.62
Perc Pop Public K-12 Enroll	0.86	3.57
BRH Liberal Citizen Ideology 2008	0.36	
Real Gross State Product PC	0.55	2.06
State Fiscal Balance as Perc of Expend	-0.06	-0.14
Unemployment Rate	-0.31	
Perc Poor Roads		0.43
No Debt Limits Dummy		-0.31
No Mandatory Rev or Spend Limits Dummy		0.35
No State Income Tax Dummy		0.37
Perc State/Loc Expend Local		-0.98
Real Total 2007 Debt 1000\$s PC _i	0.49	2.13

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